In the Claims:

1. (currently amended): A method comprising:

receiving a first packet of information on an input optical signal that occupies a plurality of input channels, each input channel being included in one among an input plurality of distinct wavelength ranges **that are respectively in selected International Telecommunication Union (ITU) WDM windows**; and

transmitting the first packet of information on an output optical signal that occupies a plurality of output channels, each output channel being included in one among an output plurality of distinct wavelength ranges,

wherein the plurality of input channels includes **at least a plurality of adjacent WDM channels within one ITU WDM window which comprise**:

(A) a reserved wavelength buffer **selected from one of the plurality of adjacent WDM channels within the one ITU WDM window**; and

(B) a channel on which the first packet is received,

wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input plurality of wavelength ranges is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of increasing wavelength, the wavelength range including the reserved wavelength buffer being associated with the wavelength range including the active wavelength buffer.

2. (original): A method as in claim 1 further comprising:

transmitting, prior to the receiving, information including the first packet on the input optical signal, the transmitting including reserving the reserved wavelength buffer.

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3. (original): A method as in claim 1, further comprising receiving an additional input optical signal having a second packet of information wherein the second packet of information is carried within the additional input optical signal over substantially the channel on which the first packet is received.

4. (original): A method as in claim 1, further comprising:

prior to transmitting the first packet of information on the output optical signal, extracting label information from the

input optical signal, the label information including information about the first packet of information;

generating a control signal according to at least a portion of the label information;

controlling a signal-producing component to reproduce the first packet of information within the output optical signal in the active wavelength buffer; and

re-associating the label information with the first packet of information.

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5. (currently amended): A method as in claim 4, wherein the label information is carried within the input signal in a channel distinct from ~~the first~~ **an** input channel **that carries data** and distinct from the reserved wavelength buffer and within the output signal in a channel distinct from the active wavelength buffer.

6. (currently amended): ~~A method as in claim 4~~ **A method comprising:**

receiving a first packet of information on an input optical signal that occupies a plurality of input channels, each input

channel being included in one among an input plurality of distinct wavelength ranges;

transmitting the first packet of information on an output optical signal that is optically obtained from the input optical signal and occupies a plurality of output channels, each output channel being included in one among an output plurality of distinct wavelength ranges,

wherein the plurality of input channels includes:

(A) a reserved wavelength buffer; and

(B) a channel on which the first packet is received,

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wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input plurality of wavelength ranges is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of increasing wavelength, the wavelength range including the reserved wavelength buffer being associated with the wavelength range including the active wavelength buffer;

prior to transmitting the first packet of information on the output optical signal, extracting label information from the input optical signal, the label information including information about the first packet of information ;

generating a control signal according to at least a portion of the label information;

controlling a signal-producing component to reproduce the first packet of information within the output optical signal in the active wavelength buffer; and

re-associating the label information with the first packet of information, wherein the signal-producing component comprises:

a local oscillator controlled by the control signal to produce a local oscillator signal, **and**

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a modulator, accepting as one input, the local oscillator signal, and as another input, a signal representing the first packet of information, the modulator further producing as an output, a modulated output signal including the first packet of information.

7. (original): A method as in claim 6, wherein a frequency of the local oscillator signal corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

8. (original): A method as in claim 6, wherein the modulator is a Mach-Zender modulator.

9. (original): A method as in claim 4, wherein the signal-producing component comprises:

a laser, controlled according to the control signal to produce a laser signal, and

a semiconductor optical amplifier, accepting as one input the laser signal, and as another input a signal representing the first packet of information, the semiconductor optical amplifier further producing as an output, a modulated output signal including the first packet of information.

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10. (currently amended): ~~A method as in claim 9~~ **A method comprising:**

receiving a first packet of information on an input optical signal that occupies a plurality of input channels, each input channel being included in one among an input plurality of distinct wavelength ranges;

transmitting the first packet of information on an output optical signal that occupies a plurality of output channels,

each output channel being included in one among an output plurality of distinct wavelength ranges,

wherein the plurality of input channels includes:

(A) a reserved wavelength buffer, and

(B) a channel on which the first packet is received,

wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input plurality of wavelength ranges is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of increasing wavelength, the wavelength range including the reserved wavelength buffer being associated with the wavelength range including the active wavelength buffer;

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prior to transmitting the first packet of information on the output optical signal, extracting label information from the input optical signal, the label information including information about the first packet of information;

generating a control signal according to at least a portion of the label information;

controlling a signal-producing component to reproduce the first packet of information within the output optical signal in the active wavelength buffer; and

re-associating the label information with the first packet of information ,

wherein the signal-producing component comprises:

a laser, controlled according to the control signal to produce a laser signal, and

a semiconductor optical amplifier, accepting as one input the laser signal, and as another input a signal representing the first packet of information, the semiconductor optical amplifier further producing as an output, a modulated output signal including the first packet of information, wherein the laser signal has a frequency which corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

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11. (original): A method as in claim 1, further comprising:

extracting label information, the first packet of information, and a carrier from the input optical signal;

producing a first electronic signal representing information from the first packet of information; and

producing a second electronic signal representing the label information,

wherein transmitting the first packet of information further comprises modulating the carrier with the first and second electronic signals to produce the output optical signal.

12. (original): A method as in claim 1, further comprising:

extracting label information and the first packet of information from the input optical signal;

producing a first electronic signal representing information from the first packet of information;

producing a second electronic signal representing the label information; and

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controlling a first and second laser diode according to the first and second electronic signals, respectively, to produce the output optical signal.

13. (currently amended): A device comprising:

an optical receiver, the optical receiver configured and arranged to receive a first packet of information on an input optical signal that occupies a plurality of input channels, each input channel being included in one among an input plurality of wavelength ranges **that are respectively in selected International Telecommunication Union (ITU) WDM windows**;

and an optical transmitter, the optical transmitter being configured and arranged to transmit an output optical signal that occupies a plurality of output channels, each output channel being included in one among an output plurality of wavelength ranges,

wherein the plurality of input channels includes **at least a plurality of adjacent WDM channels within one ITU WDM window which comprise**:

(A) a reserved wavelength buffer **selected from one of the plurality of adjacent WDM channels within the one ITU WDM window**; and

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(B) a channel on which the first packet is received,

wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input range of wavelength portions is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of increasing wavelength, the wavelength range occupied by the reserved wavelength buffer being associated with the wavelength range occupied by the active wavelength buffer.

14. (original): A device as in claim 13, wherein the optical receiver is further configured and arranged to receive an additional input optical signal having a second packet of information wherein the second packet of information is carried within the second input optical signal over substantially the channel on which the first packet is received.

15. (original): A device as in claim 13, further comprising:

a label reader, configured and arranged to, prior to the transmitting of the output optical signal, extract label information from the input optical signal, the label information including information about the first packet of information;

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a control signal generator, configured and arranged to generate a control signal according to at least a portion of the label information;

a signal-producing component, configured and arranged to reproduce the first packet of information within the output optical signal in the active wavelength buffer; and

a labeling component, configured and arranged to associate the label information with the first packet of information.

16. (currently amended): ~~A device as in claim 13~~ A device comprising:

an optical receiver, the optical receiver configured and arranged to receive a first packet of information on an input optical signal that occupies a plurality of input channels, each input channel being included in one among an input plurality of wavelength rang; and

an optical transmitter, the optical transmitter being configured and arranged to transmit an output optical signal that occupies a plurality of output channels, each output channel being included in one among an output plurality of wavelength ranges,

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wherein the plurality of input channels includes:

(A) a reserved wavelength buffer; and

(B) a channel on which the first packet is received,

wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input range of wavelength portions is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of increasing wavelength, the wavelength range occupied by the reserved wavelength buffer being associated with the wavelength range

occupied by the active wavelength buffer, wherein the signal-producing component comprises:

a local oscillator controlled by the control signal to produce a local oscillator signal, **and**

a modulator, accepting as one input, the local oscillator signal, and as another input, a signal representing the first packet of information, the modulator further producing as an output, a modulated output signal including the first packet of information.

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17. (original): A device as in claim 16, wherein a frequency of the local oscillator signal corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

18. (original): A device as in claim 16, wherein the modulator is a Mach-Zender modulator.

19. (original): A device as in claim 15, wherein the signal-producing component comprises:

a laser, controlled according to the control signal to produce a laser signal, and

a semiconductor optical amplifier, accepting as one input the laser signal, and as another input a signal representing the first packet of information, the semiconductor optical amplifier further producing as an output, a modulated output signal including the first packet of information.

20. (currently amended): ~~A device as in claim 19,~~

A device comprising:

an optical receiver, the optical receiver configured and arranged to receive a first packet of information on an input optical signal that occupies a plurality of input channels, each input channel being included in one among an input plurality of wavelength ranges;

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and an optical transmitter, the optical transmitter being configured and arranged to transmit an output optical signal that occupies a plurality of output channels, each output channel being included in one among an output plurality of wavelength ranges,

wherein the plurality of input channels includes:

(A) a reserved wavelength buffer, and

(B) a channel on which the first packet is received,

wherein the plurality of output channels includes an active wavelength buffer on which the first packet is transmitted, and

wherein each among the input range of wavelength portions is associated, in order of increasing wavelength, with one among the output plurality of wavelength ranges in order of increasing wavelength, the wavelength range occupied by the reserved wavelength buffer being associated with the wavelength range occupied by the active wavelength buffer;

a label reader, configured and arranged to, prior to the transmitting of the output optical signal, extract label information from the input optical signal, the label information including information about the first packet of information;

a control signal generator, configured and arranged to generate a control signal according to at least a portion of the label information;

a signal-producing component, configured and arranged to reproduce the first packet of information within the output optical signal in the active wavelength buffer; and

a labeling component, configured and arranged to associate the label information with the first packet of information

wherein the signal-producing component comprises:

a laser, controlled according to the control signal to produce a laser signal, and

a semiconductor optical amplifier, accepting as one input the laser signal, and as another input a signal representing the first packet of information, the semiconductor optical amplifier further producing as an output, a modulated output signal including the first packet of information, and

wherein the laser signal has a frequency which corresponds to a difference in frequency between the channel on which the first packet is received and the active wavelength buffer.

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21. (original): A device as in claim 13, wherein the input optical signal includes a carrier signal and label information, the device further comprising:

at least one filter, configured and arranged to extract the carrier signal from the input optical signal;

a label reader, configured and arranged to extract label information from the input optical signal;

a label writer, configured and arranged to produce a first electronic signal representing the extracted label information;

a signal regenerator, configured and arranged to produce a second electronic signal representing the first packet of information; and

a modulator configured and arranged to modulate the carrier with the first and second electronic signals to produce the output optical signal.

22. (original): A device as in claim 13, further comprising:

a label writer, configured and arranged to produce a first electronic signal representing the label information;

a signal regenerator, configured and arranged to produce a second electronic signal representing the first packet of information; and

a first and second laser diode, controlled according to the first and second electronic signals, respectively, to produce the output optical signal.

23. (currently amended): A method of transmitting a signal, comprising:

receiving a broadband input optical signal including a payload and label information **that are carried in a plurality of**

input WDM channels that are respectively within selected International Telecommunication Union (ITU) WDM windows, wherein each ITU WDM window includes a plurality of adjacent input WDM channels with one selected input WDM channel being empty as a buffer;

receiving the label information with a baseband optical receiver;

modifying the label information to produce modified label information; and

re-combining the modified label information with the payload to produce an output optical signal including the payload and the modified label information.

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[Please add the following new claims:]

24. (new): A device, comprising:

an optical input port to receive a wavelength-division multiplexed (WDM) signal having a plurality of different WDM channels within each single International Telecommunication Union (ITU) WDM window, wherein at least one of the WDM channels is empty and is reserved as a buffer channel;

an optical splitter to split the received WDM signal into a first optical signal and a second optical signal;

a first optical filter to filter the first optical signal to produce an optical label signal which carries only label information of each WDM channel;

a second optical filter to filter the second optical signal to produce an optical data signal which carries data of each WDM channel without the label information;

an optical modulator to modulate the optical data signal at a selected local oscillator frequency to shift a selected WDM channel by the selected local oscillator frequency to fall within the buffer channel;

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a label unit to receive the optical label signal and to produce a new optical label channel to reflect channel shifting done by said optical modulator; and

an optical combiner to combine the optical label channel and the optical data signal output from said optical modulator to produce a new WDM signal.

25. (new): The device as in claim 24, wherein said label unit includes:

a tunable laser to produce a laser carrier at a label channel frequency;

a second optical modulator responding to label information in the first optical signal to modulate the laser carrier and to produce the new optical label channel; and

an optical delay line to cause a delay in the new optical label channel to synchronize with the optical data signal output at said optical combiner.

26. (new): The device as in claim 24, wherein said label unit includes:

a first optical receiver to convert the first optical signal into a first electrical signal; and

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a label processor to extract the label information from the first electrical signal.

27. (new): The device as in claim 26, wherein the label unit further comprises a local oscillator to produce a signal at the selected local oscillator frequency which controls said optical modulator, wherein said local oscillator is coupled to said label processor.

28. (new): The device as in claim 27, wherein said local oscillator includes a tunable laser to produce a pump laser beam

at the selected local oscillator frequency, and wherein said optical modulator includes a semiconductor optical amplifier modulator which changes an optical gain for the second optical signal in response to the pump laser beam.

29. (new): The device as in claim 24, further comprising:

a second optical splitter to split a part of the second optical signal as a label optical carrier signal to the label unit,

wherein said label unit includes:

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an optical bandpass filter to filter the label optical carrier signal to remove modulation bands, and

a second optical modulator to modulate the filtered label optical carrier signal in response to the label information in the first optical signal to produce the new optical label channel.

30. (new): A method, comprising:

splitting a received wavelength-division multiplexed (WDM) signal into a first optical signal and a second optical signal, wherein the received WDM signal includes a plurality of different WDM channels within each single International

Telecommunication Union (ITU) WDM window and at least one of the WDM channel is empty and is reserved as a buffer channel;

filtering the first optical signal to produce an optical label signal which carries only label information of each WDM channel;

filtering the second optical signal to produce an optical data signal which carries data of each WDM channel without corresponding label information;

optically modulating the optical data signal at a selected local oscillator frequency to shift a selected WDM channel by the selected local oscillator frequency to the buffer channel;

producing a new optical label channel to reflect updated channel information after channel shifting in the optical modulation; and

combining the new optical label channel and the optical data signal after the optical modulation to produce a new WDM signal.

31. (new): A device, comprising:

an optical input port to receive a wavelength-division multiplexed (WDM) signal having a plurality of different WDM channels within each single International Telecommunication

Union (ITU) WDM window, wherein at least one of the WDM channel is empty and is reserved as a buffer channel;

an optical splitter to split the received WDM signal into first, second and third optical signals;

a label processing module to process label information in the first optical signal to produce a first electrical control signal having new label information for a channel shifting arrangement;

an optical filter to filter the second optical signal to remove modulation bands thereon to produce an optical carrier signal;

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a data signal regenerator to receive the third optical signal to process data in each WDM channel in the third optical signal to generate a second electrical control signal having data in the received WDM signal; and

an optical modulator to modulate the optical carrier signal in response to the first and the second electrical control signals to shift a selected WDM channel to the buffer channel according to the channel shifting arrangement to produce a new WDM signal.

32. (new): The device as in claim 31, wherein the signal regenerator comprises:

an optical filter to filter and remove label information from the third optical signal;

an optical receiver to convert the filtered third optical signal into an electrical signal having input data;

an electronic signal regenerator to generate an electrical data signal having the input data; and

a modem to produce the second electrical control signal in response to the electrical data signal.

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33. (new): The device as in claim 32, wherein said electronic signal generator is coupled to receive an input from the label processing module and to drop input data of a selected WDM channel in response to the input.

34.(new): The device as in claim 31, wherein the label processing module comprises:

an optical receiver to convert the first optical signal into a first signal;

a label processor to process the first signal and to produce a new label;

a label writer to produce a label writing signal in response to the new label; and

a modulator to produce the first electrical control signal in response to the label writing signal.

35. (new): A device, comprising:

an optical input port to receive a wavelength-division multiplexed (WDM) signal having a plurality of different WDM channels within each single International Telecommunication Union (ITU) WDM window, wherein at least one of the WDM channels is empty and is reserved as a buffer channel;

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an optical splitter to split the received WDM signal into first, second and third optical signals;

a label processing module to process label information in the first optical signal to produce an optical label signal which is modulated to carry new label information for a channel shifting arrangement;

an optical filter to filter the second optical signal to remove modulation bands thereon to produce an optical carrier signal;

a data signal regenerator to process data in each WDM channel in the third optical signal to generate an optical data

signal having data in the received WDM signal to shift a selected WDM channel to the buffer channel according to the channel shifting arrangement; and

an optical combiner to combine the optical signal, label the optical carrier signal, and the optical data signal to produce a new WDM signal.

36. (new): The device as in claim 35, wherein said label processing module comprises:

an optical filter to filter the first optical signal to remove data and to retain label information;

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an optical receiver to convert the filtered first optical signal into a first signal;

a label processor to process the first signal and to produce a new label;

a label writer to produce a label writing signal in response to the new label; and

a label optical transmitter responsive to the label writing signal to produce the optical label signal.

37. (new): The device as in claim 35, wherein said data signal regenerator comprises:

an optical filter to filter and remove label information from the third optical signal;

an optical receiver to convert the filtered third optical signal into an electrical signal having input data;

an electronic signal regenerator to generate an electrical data signal having the input data; and

a data optical transmitter to produce the optical data signal in response to the electrical data signal.

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38. (new): A device, comprising:

an optical input port to receive a wavelength-division multiplexed (WDM) signal having a plurality of different WDM channels, wherein at least one of the WDM channels is empty and is reserved as a buffer channel and another of the WDM channels carries label information of the WDM signal;

an optical splitter to split the received WDM signal into a first optical signal and a second optical signal;

a first optical filter to filter the first optical signal to select the WDM channel that carries only the label information;

a second optical filter to filter the second optical signal to produce an optical data signal which carries data of each WDM channel without the label information;

an optical modulator to modulate the optical data signal at a selected local oscillator frequency to shift a selected WDM channel by the selected local oscillator frequency to fall within the buffer channel;

a label generator to produce a new optical label channel to reflect channel shifting done by said optical modulator; and

an optical combiner to combine the optical label channel and the optical data signal output from said optical modulator to produce a new WDM signal.

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39. (new): The device as in claim 38, wherein the optical modulator includes a Mach-Zehnder modulator.

40. (new): A method, comprising:

splitting a received wavelength-division multiplexed (WDM) signal into a first optical signal and a second optical signal, wherein the received WDM signal includes a plurality of different WDM channels within each single International

Telecommunication Union (ITU) WDM window and at least one of the WDM channel is empty and is reserved as a buffer channel;

filtering the first optical signal to produce an optical label signal which carries only label information of each WDM channel;

filtering the second optical signal to produce an optical data signal which carries data of each WDM channel without corresponding label information;

processing the optical data signal to shift a frequency of a selected WDM channel to the buffer channel in a new optical data signal;

producing a new optical label channel to reflect updated channel information after the shifting; and

combining the new optical label channel and the new optical data signal after the optical modulation to produce a new WDM signal.

41. (new): A method, comprising:

providing a wavelength-division multiplexed (WDM) signal, wherein the WDM signal includes a plurality of different WDM channels, wherein at least one of the WDM channels is empty and

is reserved as a buffer channel and another of the WDM channels carries label information of the WDM signal;

splitting the WDM signal into a first optical signal and a second optical signal;

processing the first optical signal to obtain the label information and to modify the label information to swap labels of different WDM channels and to produce a new label signal;

optically modulating a laser beam in response to the new label signal to produce an new optical label signal carrying the new label signal;

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optically filtering the second optical signal to produce an optical data signal which carries data of each WDM channel without the label information; and

optically combining the optical data signal and the new optical label signal to a new WDM signal with swapped labels.

42. (new): A device, comprising:

an optical input port to receive a wavelength-division multiplexed (WDM) signal having a plurality of different WDM channels, wherein at least one of the WDM channels is empty and is reserved as a buffer channel and another of the WDM channels carries label information of the WDM signal;

an optical splitter to split the received WDM signal into first, second and third optical signals;

a label processing module to process label information in the first optical signal to produce an electrical label signal which that swaps labels of different WDM channels;

an optical filter to filter the second optical signal to remove modulation bands thereon and to transmit an optical carrier signal;

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an optical modulator to modulate the optical carrier signal in response to the electrical label signal to produce an optical label signal;

a data signal delay module to remove the label information from the third optical signal to produce a delayed optical data signal that carries the input data; and

an optical combiner to combine the optical label signal and the optical data signal to produce a new WDM signal with swapped labels.